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Abstract

The paper contributes to the theory of higher structures of strategic and cooperative games. The basic model of a stochastic game is represented by a graph tree in which every vertex itself represents a game of strategy. Nevertheless, some forms of cooperation or coordination of players' behaviour are admissible. The transition from one game to another in the stochastic structure is controlled by probabilities depending on the situation in the input game. The interest is focused on stationary strategies in particular games, from the point of view of cooperative solutions, namely the Shapley values. The main contribution of the paper consists in the analysis of the model and of its elements, and the definition of subgame consistent cooperative solution. The problem of subgame consistency is suggested to be solved by adopting payoff distribution procedure. The theoretical construction is illustrated by an example.

Abstract

An algorithm for solving a matrix game and obtaining the sets of optimal strategies is produced. The algebraic solution of a 2×2 game is generalized to a $m \times n$ game. The algorithm is actively engaged for some games with incomplete information where the linear programming is not applicable.

Abstract

We consider games in which there are two types of players, the leaders and the followers. We analyze some different models, according to the fact that players of the same type act either non cooperatively or cooperatively, with the aim of providing existence of a solution of the game.

Abstract

This paper deals with a stopping game (called Dynkin's game) for a Markov chain formulated by E. B. Dynkin (1969) with modification made by J. Neveu (1975). Two players observe the Markov sequence xn, n=0,1,..., with the state space X and four functions a11, a12, a21, $c : X \to R$ are given. Each player may stop the chain at any stage n. When the chain is stopped the game is finished and Player 1 wins from

Player 2 a sum which depends on who is stopping the chain and on the current state x of the Markov chain: $a11(x) \in L$ if both stop simultaneously, $a12(x) \in L$ (resp. $A21(x) \in L$) if Player 1 (resp. Player 2) stops, where L is a class of functions with bounded expectation along the Markov chain trajectory. The investigations in the paper are confined to a subclass of Dynkin games with a12(x)=a21(x)=0 and a11(x) and c(x) positive. It is shown that the value of such games is a non-negative subharmonic function. The case of unbounded payoff a11(x) is also investigated.

Abstract

In the paper, a conflict-controlled system with linear dynamics and fixed instant of termination is considered. The useful control is assumed to be scalar and bounded. A method for constructing nonlinear robust control is elaborated. The robust control is built on the basis of special switching surface changing in time.

Abstract

In this paper we consider the investment allocation game where there is an initial allocation of the resource from a third party. Nash equilibrium are derived. The case of one and two firms game are investigated. Also the Stackelberg behaviour of the players is considered.

Abstract

The paper treats the problem of optimal risk exchange in the individual risk model of insurance as a bargaining game, where the pay-offs are expected utilities of the players. A characterization of the set of Pareto-optimal policies in the game is given. It is shown that the set consists of policies of two kinds: deductible and upper limit policies. The Nash's and Kalai-Smorodinsky's concepts for game solution are applied to find the optimal policy in the model. On the basis of a numerical example, these two solutions are compared.

Abstract

We consider a non-cooperative zero-sum game related with a model of final-offer arbitration procedure where two players L and M, interpreted here as Labour and Management, respectively, have a dispute on an improvement in the wage rate. To solve the conflict we use the so-called final-offer arbitration scheme developed by Farber (1980).

Abstract

The literature analyzing games where some players have private information about their "types" is usually based on the duality of "good" and "bad" types (GB approach), where "good" type denotes the type with better quality. In contrast, this paper analyzes a signalling game without types hierarchy. Different types have the same average qualities but different profiles of quality over time which are their private information. We apply this idea to analyze a financing-investment game where firms' insiders have private information about the firm's profit profile over time. Some firms are "performance-improving" with increasing profit profiles; others are "stagnant" with declining profit profiles. We show that equilibrium is either pooling with debt when the economy is stagnating, or separating when the economy is growing (performance-improving firms issue debt while stagnant firms issue shares). This provides new theoretical results that cannot be explained by the standard GB models and which are consistent with some financial market phenomena.

Abstract

There are some games widely played in the routine world of gambles, roulette, quiz show and the sports excercises. The object of the game is to get the highest score among all of the players in the game, from one or two chances of sampling. The two-player sequential-move, imperfect-information games with the three kids of score functions are investigated, and the optimal strategies for the two players and the winning probabilities they can get in the optimal play are derived.

Abstract

A pursuit game is called alternative if it may be terminated on one of two given terminal manifolds and two corresponding payoffs of Boltza type which differ only in their terminal parts are associated with those variants. We investigate how to reduce such a game to a set of interrelated ordinary pursuit games when solutions of the games with fixed target alternatives are known. Assumed that the pursuer selects an alternative as the target one only if a dominating condition is stable along the corresponding optimal trajectory. At the part of playing space where the dominating condition is unstable, an auxiliary game is to be set up.

We study in detail a case of convex differences of the values for fixed target alternatives with a particular pattern of their behavior along the optimal trajectories. Shown that the pursuer lowers the assured payoff at the states where no definitive target alternative is to be selected.

The approach may be also used, for example, when a solution of an ordinary differential game is being constructed with use of two families of characteristics of the main equation.

Abstract

The purpose of this paper is to show how the dynamics of the technology gap between firms helps demarcate the opposing effects of spillovers on R&D incentives. In this study, we explore the theoretical link between spillovers and technology gap by allowing the rate of spillovers to depend on the latter. In order to demonstrate the relationship between technology gap and R&D incentives, we develop a two stage game of process R&D and output competition for an ex-ante asymmetric duopoly with one-way spillovers. Also the dynamic version of a two stage R&D game is considered and three different (though non-mutually exclusive) sets of results are presented. First, we present a variant of the static AJ model with one-way endogenous spillovers. We show that the existence of a subgame perfect Nash equilibrium (SPNE) requires that the level of spillovers to be low and the initial marginal cost to be high. We show that the relationship between the free-riding behavior of the laggard and the level of spillovers is non-monotonic. We observe that they are positively related as long as the size of spillovers is small. Secondly, we develop a dynamic version of the latter model in a differential game setting. It is shown that if each firm in the industry takes into account the dynamic strategic response of its rival, results can be derived by looking at the transitional dynamics of the firms reaction functions in the neighborhood of the steady state. Lastly, we provide a general framework for analyzing dynamic AJ models with one-way endogenous spillovers. We derive some general conditions that would guarantee the existence of a steady state in a more general class of two stage R&D games with spillovers.

Abstract

In the paper the parlour game JIPTO (Jeux Intellectuels de Poursuite - Intellectual Games of Pursuit) is formulated by using the mathematical tools of the theory of pursuit games. Different modifications of JIPTO-games are classified and some most used strategies of the pursuer are presented. The whole of the geometrical proposals on the JIPTO and the other JIP presents an interesting extension of the traditional geometry.

Abstract

This paper considers optimization problems related to investment decisions under uncertainty. We examine a selection problem for portfolio of capital investment opportunities. For every possible project, the investment is irreversible but can be delayed. The precise solution is obtained in the case of deterministic projects with

zero volatilities. In general the problem is equivalent to evaluation of the American call dual strike option without expiration date. Each stock is assumed dividend-paying. In case of two projects with equal sunk costs we derive the upper bound of the option price by means of it's integral representation.

Abstract

We present a continuous model of dynamic strategic market game. We show that for values of the discount factor not greater than $2/3$ and every $\varepsilon > 0$ it possesses a pure stationary ε-equilibrium and describe optimal strategies. In addition we show that the game does not have a stationary equilibrium (0-equilibrium).

Abstract

Proportional solutions for the class of positive TU games, which depend only on the values of proportional excesses are defined. A list of properties of cooperative game solutions which are applied for the characterization both of the least square values and of the proportional values are given. A characterization of the logutilitarian proportional values and its comparison with the one of the least square values are proposed.

Abstract

Dynamic economic cooperation represents one of the most complex forms of decision-making analysis under uncertainty. In particular, interactions between strategic behavior, dynamic evolution and stochastic elements have to be considered simultaneously in the process. This complexity leads to great difficulties in the derivation of dynamically stable solutions. Despite urgent calls for cooperation in the global economy, the lack of formal analysis solutions has precluded rigorous analysis of this problem. In this paper, we examine two integral factors in constructing a solution for dynamic economic cooperation – subgame consistency and equilibrating transitory compensation.